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PATENT
RAP04 P-608C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Confirmation No. : 3319
Group Art Unit : 3651
Examiner : Joseph E. Valenza
Applicant : David W. Zeitler
Application No. : 10/679,613
Filing Date : October 6, 2003
For : **CONVEYOR INDUCT SYSTEM**
Atty. Docket No. : RAP04 P-608C
Customer No. : 28 101

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attention: Board of Patent Appeals and Interferences

Dear Sir:

APPELLANT'S BRIEF (37 CFR 1.192)

This Brief is in furtherance of the Notice of Appeal filed in this case on July 20, 2004. The fees required under § 1.17(c) for filing this Brief are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This Brief is transmitted in triplicate (37 CFR 1.192(a)).

Respectfully submitted,

DAVID W. ZEITLER

By: Van Dyke, Gardner, Linn & Burkhart, LLP

Dated: September 30, 2004.

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Alexandria, VA 22313-1450

Attention: Board of Patent Appeals and Interferences

Dear Sir:

TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION - 37 CFR 1.92)

Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on July 30, 2004.

Pursuant to 37 CFR 1.17(c), the fee for filing the APPEAL BRIEF is $330.

Attached please find a check in the sum of $330. Commissioner is hereby authorized to charge any other fees which may be required, or credit any overpayment to Deposit Account No. 22-0190. A duplicate copy of this page is enclosed.

Respectfully submitted,

DAVID W. ZEITLER

By: Van Dyke, Gardner, Linn & Burkhart, LLP

Dated: September 30, 2004.

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Dear Sir:

CERTIFICATE OF MAILING

I hereby certify that the attached Appellant's Brief on Appeal (22 pages), including cover sheet (1 page); Table of Contents (1 page); and Appendix – Rejected Claims (7 pages) and Declaration of Jerry J. Jakeway Under 37 C.F.R. §1.132 (8 pages); (cover sheet, Brief, Table of Contents, Appendix and Declaration of Jerry J. Jakeway Under 37 C.F.R. §1.132 submitted in triplicate); Appellant's Brief (37 CFR 1.192) transmittal letter (1 page); Transmittal of Appeal Brief (Patent Application - 37 CFR 1.92) (1 page, in duplicate); check in the amount of $330 for the filing fee; and return postcard are being deposited with the United States Postal Service as first class mail, postage fully prepaid, in an envelope addressed to:

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on September 30, 2004.

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Dear Sir:

BRIEF ON APPEAL

Respectfully submitted,

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Dated: September 30, 2004.

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APPELLANT'S BRIEF

I. REAL PARTY IN INTEREST

The real parties in interest are the assignee of the present application, Rapistan Systems Advertising Corp., its parent company Siemens A.G., and its licensee Siemens Dematic Corp.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences known to appellant or its legal representative will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal. The present application is a continuation under 37 C.F.R. 1.53(B)(1) of application Serial No. 09/851,021, filed May 8, 2001, now U.S. Patent No. 6,629,593, which claims priority from provisional application Serial No. 60/203,301, filed on May 11, 2000.

III. STATUS OF CLAIMS

Claims 55-94 are pending in this application. All of these claims were rejected in the Office Actions of July 8, 2004 and April 30, 2004. The rejection of claims 55-94 is appealed herein.

IV. STATUS OF AMENDMENTS

All claim amendments are believed to have been entered in this case. The attached appendix reprints all of the pending claims in their current form.

V. SUMMARY OF INVENTION

The present invention generally relates to conveyor systems, and more particularly to the induction section of a conveyor sortation system (page 1, lines 5-6). The induction section of a conveyor system generally refers to the portion of the conveying system in which articles are inducted, or initiated, into the conveying sortation system (page 1, lines 6-8). The induction system typically performs the function of providing the proper gaps between packages, or other articles traveling on the conveying system, so that the packages can be sorted for proper distribution (page 1, lines 8-10). The proper gapping helps increase the throughput of the system, and may help during the sortation process as articles are moved off of the conveyor (page 1, lines 10-12, 18-24).

Figure 1 illustrates a combined plan view and block diagram of a conveying system according to one embodiment of the invention (page 5, lines 2-3). The conveyor induct system 20 illustrated therein includes two conveyors 22 and 24 that are fully illustrated, and two partially illustrated conveyors 30 and 32 (page 5, lines 23, 27-30). Articles 34a-g travel on top of the conveyors and move in direction 28 (page 6, lines 2-3). As the articles transition across the interface between conveyor 24 and 32, a gap control system 40 controls the speed of a motor 76 that, in turn, controls the speed of conveyor 24 (page 5, lines 15-18; page 13, lines 16-18). By appropriately controlling the speed of motor 76, gap control system 40 works to create a gap of a desired size between articles 34 as they move onto conveyor 32 (page 11, lines 26-28).

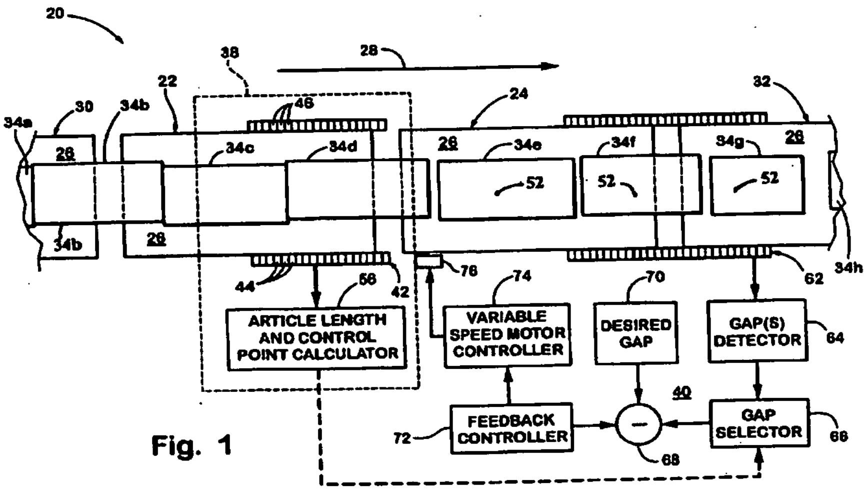

Fig. 1

More particularly, conveyor induct system 20 includes a horizontal array of photo-detectors 62 that, in combination with a gap detector 64, determine the size of the gap between successive articles (page 12, lines 2-13). System 20 compares this measured gap size with a desired gap size and, if they are different, adjusts the speed of conveyor 24 to bring the actual gap size closer to the desire gap size (page 12, lines 28-32). For the embodiment illustrated in Fig. 1, these adjustments may be made until the control point of the upstream one of the articles that defines the gap is reached (page 13, lines 16-21). The control point is the point on the article which, when it is aligned with a specified reference point on the conveyor, will designate the moment in time that the article's speed switches from being controlled by one belt to another belt (page 7, lines 17-20). When the control point is reached, the article transitions onto conveyor 32 and adjustments to its speed are no longer controllable by motor 76 (page 13, lines 28-30). The location of the control point may either be measured, such as by control point determination module 38, or it may be assumed (page 14, lines 5-9).

Multiple gap control systems 40 are added downstream of the gap control system 40 illustrated in Fig. 1 so that gap adjustments are implemented sequentially (page 14, lines 16-17). Such a sequential array of gap control systems further increases the accuracy of the final gap, particularly where the desired gap differs substantially from the gaps that pre-exist between the articles being fed into the first gap control system 40 (page 14, lines 17-19).

VI. ISSUES

Issue #1:	Whether claims 55-94 are invalid under an unspecified portion of 35 U.S.C. §112 because they do not include limitations requiring two conveyor interfaces to have the same frictional and spacing characteristics.
Issue #2:	Whether claims 55-94 are invalid under an unspecified portion of 35 U.S.C. §112 because they do recite either a gap selector or selecting a gap.
Issue #3:	Whether claims 59, 69, 79, and 89 are invalid under 35 U.S.C. §112 for lack of written description because the application allegedly does not disclose the assumption of control points.
Issue #4:	Whether claims 59, 69, 79, and 89 are invalid under 35 U.S.C. §132 because the assumption of control points is allegedly new matter.
Issue #5:	Whether claims 60-61, 70-71, 80-81, and 90-91 are invalid under an unspecified portion of 35 U.S.C. §112 because they use the terms "measures" or "measuring" instead of "determines" or "determining."

Issue #6: Whether claims 55-94 are invalid under either 35 U.S.C. §102(b) or 35 U.S.C. §103(a) in light of U.S. Patent No. 4,369,876 issued to Small et al.[1]

VII. GROUPING OF CLAIMS

With respect to issue #1 identified above (whether claims 55-94 are invalid under an unspecified portion of 35 U.S.C. §112 because they do not include limitations requiring two conveyor interfaces to have the same frictional and spacing characteristics), claims 55-94 shall stand or fall together.

With respect to issue #2 identified above (whether claims 55-94 are invalid under an unspecified portion of 35 U.S.C. §112 because they do recite either a gap selector or selecting a gap), claims 55-64 and 75-84 shall stand or fall together separate from the other claims. Claims 65-74 and 85-94 shall stand or fall together separate from the other claims.

With respect to issue #3 identified above (whether claims 59, 69, 79, and 89 are invalid under 35 U.S.C. §112 for lack of written description because the application allegedly does not disclose the assumption of control points), claims 59, 69, 79, and 89 shall stand or fall together separate from the other claims.

With respect to issue #4 identified above (whether claims 59, 69, 79, and 89 are invalid under 35 U.S.C. §132 because the assumption of control points is allegedly new matter), claims 59, 69, 79, and 89 shall stand or fall together separate from the other claims.

With respect to issue #5 identified above (whether claims 60-61, 70-71, 80-81, and 90-91 are invalid under an unspecified portion of 35 U.S.C. §112 because they use the terms "measures" or "measuring" instead of "determines" or "determining"), claims 60-61, 70-71, 80-81, and 90-91 shall stand or fall together separate from the other claims.

With respect to issue #6 identified above (whether claims 55-94 are invalid under either 35 U.S.C. §102(b) or 35 U.S.C. §103(a) in light of U.S. Patent No. 4,369,876 issued to Small et al.), claims 55-58, 62-63, 75-78, and 82-83 shall stand or fall together separate from the other claims. Claims 59, 69, 79, and 89 shall stand or fall together separate from the other claims. Claims 60-61, 70-71, 80-81, and 90-91 shall stand or fall together separate from the other claims. Claims 64, 74, 84, and 94 shall stand or fall together separate from the other claims. Claims 65-68, 72-73, 85-88, and 92-93 shall stand or fall together separate from the other claims.

---

[1] It is not entirely clear whether the Examiner has based this rejection on anticipation under §102(b) or obviousness under §103(a). The Office Action of April 30, 2004 based the rejection on §103(a) obviousness. However, the rejection read like a §102(b) rejection and it was virtually identical to the §102 rejection initially made in the parent application (now U.S. Patent No. 6,629,593). In any event, claims 55-94 are neither anticipated nor rendered obvious by the Small patent.

It will be understood that the groupings of these claims for these issues are being chosen for the purposes of expediting this appeal, but should in no way be construed as an admission that Applicant does not consider one or more of the individual claims in these groups to be separately patentable from any of the other claims in the same group.

VIII. ARGUMENT

Issues #1-6 in this case are addressed separately below in subsections A-F, respectively. An expert declaration of Mr. Jerry Jakeway is being submitted herewith under 37 C.F.R. §1.132 in support of this appeal. This declaration was previously submitted to the Examiner for consideration prior to this appeal. In light of this declaration and the following comments, withdrawal of the claim rejections is requested.

A. (Issue #1) Applicant Need Not Claim Conveyor Interfaces Having Similar Frictional and Size Characteristics

As set forth on pages 2-3 of the Office Action of April 30, 2004, claims 55-94 were rejected for being based on an allegedly inadequate disclosure because nothing in these claims requires the different conveyor interfaces to have the same frictional characteristics and gap sizes. Page 3 of that Office Action states that this rejection:

> may simply be addressed by amending the claims to require that the downstream interface has the same conveyor gap as the upstream interface and the surface friction characteristics of the belts at the downstream interface are the same as those at the upstream interface.

Applicant submits that it is not necessary to limit the claims to conveyor interfaces having the same conveyor gap sizes and surface frictional characteristics because it would impose a requirement that has no legal or factual justification. There are at least five independent reasons why it is not necessary to limit the claims to conveyor interfaces having the same gap and frictional characteristics. These five reasons are discussed individually below in subsections 1-5.

1. Having The Same Characteristics at Conveyor Interfaces is Not a Critical Feature of the Invention

Section 2164.08(c) of the Manual of Patent Examining Procedure states that features may be required to be incorporated into the claims if the features are critical. In determining whether an unclaimed feature is critical, however, the entire disclosure must be considered. *Id.* Further, features which are merely preferred embodiments are not to be considered critical. *In re Goffe*, 542 F.2d 564, 567, 191 USPQ 429, 431 (CCPA 1976). The MPEP further provides the following guidance about whether or not an unclaimed feature is critical:

> [a] rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made only when the language of the specification makes it clear that the limitation is critical for the invention to function as intended. Broad language in the disclosure, including the abstract, omitting an allegedly critical feature, tends to rebut the argument of criticality.

Nothing whatsoever in the present application indicates that the frictional characteristics of the conveyor interfaces have to be the same, or that their gap sizes have to be the same. The specification thus *rebuts* the conclusion that these features are critical. Any assertion that either the conveyor gap sizes or the conveyor frictional characteristics must be the same is therefore legally unfounded. For this reason alone, the requirement to insert language into the claim is incorrect.

2. There Is No Requirement That Applicant Claim Features Directed to a Separate and Independent Aspect of the Invention

The rejection for failing to specify similar conveying interfaces is also incorrect because the Applicant is free to claim independent aspects of his invention. The pending application is directed to two separate subsystems that may be utilized independently of each other, or in combination with each other. These two subsystems comprise a control point determination module 38 that accurately measures the location of control points of articles traveling on the conveyor surfaces (p. 5, lines 31-33), and a gap control system 40 that control the gaps between articles on the conveying system by varying the speed of one or more conveyors (p. 6, lines 1-3). As is explicitly stated on page 5 of the application:

> Conveyor induct system 20 comprises two subsystems which can be utilized independently from each other or in combination with each other.

Applicant has therefore made it clear that there is no required link between the two subsystems. They can work with each other, or independently of each other. However, the Examiner's requirement that the conveyor interface(s) of the gap control system 40 have the same characteristics (conveyor gap size and friction) as the conveyor interface of the control point determination module 38 imposes an unbreakable connection between the two subsystems that simply doesn't exist. In essence, this requirement seeks to re-write Applicant's specification and invention in a manner contrary to what Applicant disclosed.

In one embodiment of the invention disclosed by the Applicant, the control point determination module 38 identifies the location of the control points on articles and passes this information onto the gap control system 40. Gap control system 40 uses this information to help it create the desired gaps between articles. In this embodiment of the invention, control point determination module 38 and gap control system 40 work in combination with each other. However, this is only one of the several embodiments disclosed by Applicant.

In another embodiment, the gap control system 40 works without control point determination module 38. This other embodiment is described on page 14 of the specification (lines 23-27) where it states:

> ...the invention contemplates that such control point information may come from control point determination module 38, or it may come from other sources as well. For example, it would be possible to utilize gap control system 40 wherein the control point information was merely an assumption as to the location of the control point, such as the center point of the article. [Emphasis added].

This disclosure makes it clear that at least one embodiment of the invention uses gap control system 40 without control point determination module 38. The requirement that the claims recite similar conveyor interfaces in both subsystems 38 and 40 limits the claims to the one embodiment in which both subsystems 38 and 40 are present, and unjustifiably precludes Applicant from claiming subsystem 40 by itself. There is no legal or factual basis for preventing Applicant from claiming a properly disclosed embodiment of his own invention.

3. There Is No Requirement That Applicant Claim Only a Theoretically Perfect Embodiment of the Invention

The requirement to amend the claims to limit them to a system with the interfaces of subsystems 38 and 40 being the same is also unwarranted because it relies on another false premise. Specifically, it reflects an incorrect belief that claims have to recite a theoretically perfect embodiment of the invention. Page 3 of the April 30, 2004 Office Action states:

> The reliance of the upstream control point determination caused at the first interface with one size conveyor gap, conveyor surface friction characteristics and surface speeds for use in article gap control at a downstream interface with at least one difference in conveyor gap size, speeds or surface friction characteristics introduces error into the article gap control because the control point will change if these interface values are different from those at the first interface.

Even if conveyor interfaces with different characteristics were to introduce error into the system, it is irrelevant. There is no legal requirement that claims recite error-free embodiments. "The mere fact that the system has some drawbacks, or that under certain postulated conditions it may not work...does not detract from the operability of the disclosed equipment to perform its described function." *Decca, Ltd. v. United States*, 544 F.2d 1070, 191 USPQ 439 (Ct. Cl. 1976). *See also Hildreth v. Mastoras*, 257 U.S. 27, 34 (1921) ("The machine patented may be imperfect in its operation; but if it embodies the general principle and works...it is enough."). Thus, the contention that different conveyor interface characteristics may introduce errors, to which Applicant does not acquiesce, can in no way require an applicant to rewrite his claims. The above case law makes clear that even *inoperative* embodiments, which are a lot more objectionable than the operative embodiments with potential errors noted here by the Examiner, cannot justify claim invalidity. "It is well settled that the apparatus disclosed in an application need not necessarily be operative in the exact form in which it is shown and described." *Ex parte Allen*, 2 USPQ2d 1425, 1428 (B.P.A.I. 1987). Whether different conveyor interface characteristics created errors in the system is therefore legally irrelevant—claims simply don't need to recite error-free embodiments.

Further, the specification clearly discloses that the invention may be used in embodiments with varying degrees of accuracy. As noted above, the specification explains that the control point determination module 38 is an optional component of one aspect of the invention and that gap control system 40 may be used in a manner that may create errors. Lines 24-27 of page 14 explicitly state that:

> For example, it would be possible to utilize gap control system 40 wherein the control point information was merely an assumption as to the location of the control point, such as the center point of the article. While such a system would likely be more inaccurate than a system in which the control point was actually measured, gap control system 40 finds equal applicability to such a system.

The disclosure therefore makes it clear that it is not necessary that the location of the control point be 100% accurate. In fact, the control of the gap can be based on a mere assumption as to the location of the control point. Consequently, to the extent different frictional characteristics between the conveyor interfaces might affect the accuracy of the control point determination, this is immaterial to how Applicant has chosen to define the invention in the claims.

Applicant need not claim a theoretically error-free embodiment of its invention, nor limit his claims to exclude situations that a person skilled in the art would typically avoid. The rejection of the claims should be withdrawn for this additional reason.

4. Applicant is Entitled to Claim Systems in Which the Conveyor Interfaces of Subsystems 38 and 40 are Different

Applicant is also not required to insert claim language specifying that subsystem 38 and subsystem 40 have the same characteristics because Applicant is free to claim embodiments of the invention where these interface characteristics are different. The Office Action states that the claims must be limited to systems in which the interfaces of subsystems 38 and 40 are the same because there is allegedly no description of how the system could operate with different interface characteristics. But this contention, even if true, doesn't justify the rejection. Claims do not have to be limited to cover only those methods of operation that are explicitly disclosed in an application.

35 U.S.C. §112 does not require that a claim exclude coverage to subject matter that operates in a different manner than what is disclosed in the specification. As stated by the Federal Circuit,

> If an invention pertains to an art where the results are predictable, e.g. mechanical as opposed to chemical arts, a broad claim can be enabled by disclosure of a single embodiment...and is not invalid for lack of enablement simply because it reads on another embodiment of the invention which is inadequately disclosed.[2]

The present invention is an electro/mechanical invention. It is therefore in a predictable art. Because the claims currently do not recite any limitations about the gap size and frictional characteristics of the conveyor interfaces, they encompass conveyor interfaces that have different sized gaps and frictional characteristics, as well as conveyor interfaces with the same sized gaps and frictional characteristics. The current claims therefore encompass systems which meet the limitations that the Examiner would like to have added to the claims; namely, those systems in which the conveyor interfaces have the same sizes and frictional characteristics. The current claims thus encompass at least one embodiment to which the Examiner does not object.

---

[2] *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 3 USPQ2d 1737, 1743 (Fed. Cir.), *cert. denied*, 484 U.S. 954 (1987). Though the Examiner hasn't specified that the rejection was based on a lack of enablement under 35 U.S.C. §112, Applicant is entitled to claim coverage over systems having different conveyor interface characteristics under any and all of the requirements of 35 U.S.C. §112.

The *Spectra-Physics* case cited above establishes that this is all that is necessary to approve the claims. As set forth by the Federal Circuit, the fact that the claims also cover embodiments which the Examiner feels are not supported under §112 (a conclusion which Applicant disagrees with) is immaterial. There is no legal precedent requiring claims to recite limitations that *exclude* from their coverage embodiments that are inadequately disclosed, let alone ones which are not in fact inadequately disclosed, but rather only *alleged* to be inadequately disclosed, as is the case here.

More importantly, the use of different conveyor interfaces is clearly disclosed in the pending application because the specification discloses using a control point location that is merely an assumption (page 14, lines 24-27). This means that there might not even be a control point determination module 38 and its associated conveyor interface. Clearly, a non-existent conveyor interface has different characteristics than one that exists. The specification therefore discloses using gapping control subsystem 40 where its conveyor interface(s) is not required to be the same as any other conveyor interface. Applicants are fully entitled to claim this. For this additional reason, the rejection should be withdrawn.

5. The Examiner Hasn't Established a Factual Explanation Why Interfaces 38 and 40 Must Have the Same Characteristics

The rejection of the claims for lack of adequate disclosure is also factually incorrect because the frictional characteristics and conveyor gap sizes at the interface(s) in gapping control subsystem 40 are largely irrelevant. As set forth in the accompanying expert declaration of Mr. Jerry Jakeway, a person skilled in the art would recognize that the speeds of the conveyors in the gapping control subsystem 40 (e.g. the interface of conveyors 24 and 32 in Fig. 1) would be set equal to each other at the time an article transitioned from one conveyor to another. (Jakeway, ¶16). This would be done so as to not alter the article gapping that had been created by gap control system 40. (Jakeway, ¶16). If the speed of the two conveyors 24 and 32 are the same at the point of article handoff, the frictional coefficient differences and belt gap differences with respect to any interface in control point determination module 38 will have *no effect* at the time of handoff. (Jakeway, ¶16). Any subsequent changes in speed between the two conveyors that may have an effect on the article gapping will very likely be minimal, due to such factors as the inherent limitation on the acceleration of the motors controlling the conveyors. A person skilled in the art would recognize that neither the same frictional characteristics nor the same conveyor gap sizes are required at both of the interfaces for the invention to work. (Jakeway, ¶16).

For any one of the five foregoing reasons, the rejection of the claims for not reciting that the conveyor interfaces of control point determination subsystem 38 and gapping control subsystem 40 are the same is improper. The rejection should therefore be withdrawn.

B. (Issue #2) Claims 55-94 Do Not Need to Recite Selecting a Gap

Claims 55-94 were rejected for allegedly being incomplete because the selection of a gap between articles is not recited in these claims. However, none of these claims require gap selection because they all include the recitation of identifying a controllable gap, which renders the recitation of gap selection unnecessary. They all also include the recitation of adjusting a controllable gap, which again renders the recitation of gap selection unnecessary. These reasons are discussed in subsection 1 below.

Claims 55-64 and 75-84, which stand or fall independently of claims 65-74 and 85-94, do not need to recite the step of gap selection because such a requirement would once again preclude Applicant from claiming an embodiment of the invention fully disclosed and supported in the specification. Also, selecting a gap is not a critical element of the invention and therefore need not be claimed. These reasons are discussed in subsection 2 below.

1. Claims 55-94 Are Allowable Because Gap Selection is Unnecessary When a Controllable Gap is Identified

Claims 55-94 include the recitation that a controllable gap is identified. There is therefore no ambiguity about which gap, if there is more than one, that is being adjusted—it is the controllable gap. The recitation of identifying the controllable gap renders it unnecessary to recite selecting a gap. Indeed, if the Examiner's requirement of selecting a gap were added to the claims, more confusion would result because then the claims would recite selecting a gap in addition to identifying a gap. This creates the confusing question as to what is the difference between selecting a gap and identifying the gap. It also confusingly implies that identifying a gap involves something different from selecting a gap, and vice versa, yet leaves one pondering what those differences might be.

Not only do claims 55-84 all recite identifying a controllable gap, they also all recite "adjusting the controllable gap." This recitation further obviates any alleged need for the claims to recite selecting a gap. By specifying that the controllable gap is adjusted, any ambiguity about which gap that is undergoing adjustment—if there are more than one sensed—is eliminated. The inclusion of the phrase "adjusting the controllable gap" in all of the claims renders it unnecessary for the claims to recite "selecting a gap," or some variation thereof. For these reasons, claims 55-94 are allowable.

2. Claims 55-64 and 75-84 are Allowable Because the Specification Clearly Discloses a System that Detects Only a Single Gap and Renders Gap Selection Unnecessary

Claims 55-64 and 75-84 are different because they are broad enough to cover situations where only a single gap may be detected and situations where multiple gaps may be detected. Applicants are entitled to cover situations where only a single gap may be detected because the specification makes it amply clear that the system of the present invention can operate without ever detecting multiple gaps. Gap selection is superfluous where only a single gap may be detected. The specification explicitly and repeatedly states that only a single gap may be detected by array 62, in which case gap selection clearly is not required because it is not possible. Page 12, lines 21-23 state:

> A gap detector 64 receives the output from array 62 and uses it to determine the gap or gaps between articles that are traveling within the zone of detection of array 62. [Emphasis added.]

Page 12, lines 32-33 further states:

> After gap detector 64 detects the one or more gaps which are within the detection zone of array 62, it passes this information to a gap selector 66. [Emphasis added].

Still further, the last sentence beginning on page 12 states:

> Gap selector 66 chooses which of the gaps detected by detector 64, if there are more than one, to use in the feedback control loop that controls the speed of conveyor 24. [Emphasis added].

All three of the foregoing quotations indisputably disclose that selecting a gap is an optional feature because there may in fact only be a single gap that is detected by array 62. In such cases, gap selection is not performed because there aren't multiple gaps to select from. Such cases fall within the scope of claims 55-64 and 75-84 because none of these claims specify that multiple gaps are sensed at a time. If Applicant is forced to add the limitation of selecting a gap to the claims, Applicant will be giving up coverage to situations in which only a single gap is detected, which is a situation clearly contemplated and described in the specification. There is no legal or factual basis for requiring Applicant to exclude subject matter disclosed in the specification as part of the invention.

The selection of a gap is clearly not a critical feature of the invention, and its inclusion in the claims can therefore not be required. Selecting a gap is only possible when multiple article gaps are detected by array 62, and detecting multiple gaps will only occur if successive articles are short enough relative to array 62 for two gaps to be detected. However, the specification discloses that the length of array 62 can be varied. This means that in some cases it may not be long enough to ever detect multiple article gaps. Page 12, lines 2-3 of the specification states:

> Array 62 preferably, although not necessarily, extends for a distance equal to the maximum expected length of articles that will be conveyed.

Clearly, if array 62 is shortened enough, it will not be possible to detect multiple gaps, thereby rendering gap selection impossible. An optional element is clearly the antithesis of a critical feature, thus rebutting any notion that gap selection is critical.

Still further, even if the array 62 is not shortened, but is used with its preferred length (that of the maximum expected article length), it is still possible that only a single article gap will be detected. Where two or more successive articles of the maximum expected length pass by array 62, there will not be more than one gap detected by array 62. (Jakeway, ¶11). In such situations, the two successive packages are too large to allow multiple gaps to be detected by array 62. Moreover, in such situations, the step of gap selection is not only not required, but also not possible. Given the fact that at least one embodiment of array 62 will not detect multiple gaps, the step of selecting from multiple gaps is clearly not a critical element of the invention. (Jakeway ¶11). Claims 55-64 and 75-84 do not recite the sensing of multiple gaps at a time, and there is no basis for requiring that selecting a gap be explicitly incorporated into the claims. Claims 55-64 and 75-84 are allowable for this additional reason.

C. (Issue #3) The Subject Matter of Claims 59, 69, 79, and 89 Is Fully Disclosed in the Specification

Claims 59, 69, 79, 89, and their dependents were separately rejected for allegedly covering subject matter not disclosed in the specification. Specifically, these claims recite that the control point is assumed, rather than measured, and the April 30 Office Action contends that "there is no original disclosure for the systems of figures 1-3 assuming control points." This is incorrect.

As has been quoted twice above, the specification states at page 14, lines 24-27:

> For example, it would be possible to utilize gap control system 40 wherein the control point information was merely an assumption as to the location of the control point, such as the center point of the article.

Clearly, this original statement from the specification discloses the concept of using an assumed control point, rather than a measured control point. The assumed control point is used by gap control subsystem 40 in the same manner that a measured control point is used. The specification clearly discloses the use of assumed control points and the rejection of claims 59, 69, 79, and 89 for allegedly containing subject matter not described in the original specification is wrong and should be withdrawn.

D. (Issue #4) Claims 59, 69, 79, and 89 Do Not Contain New Matter

Claims 59, 69, 79, and 89 were separately rejected under 35 U.S.C. §132 for allegedly containing new matter. Page 5 of the Office Action states that "there is no original disclosure for the systems of figures 1-3 assuming control points." As discussed immediately above in subsection C, page 14, lines 24-27 of the specification provide clear and full support for the system assuming control points. For the same reasons discussed above in section C, this rejection should be withdrawn.

E. (Issue #5) Claims 60-61, 70-71, 80-81, and 90-91 Are Fully Supported Because the Specification Discloses Measuring Control Points

Claims 60-61, 70-71, 80-81, and 90-91 were rejected for allegedly being based on an inadequate disclosure because of the terminology used by the Applicant in these claims. Specifically, these claims were rejected because the specification allegedly discloses only the "determination" of control points, not the "measuring" of control points. This is incorrect.

The first definition of the verb form of the term "measure" in Webster's New Universal Unabridged Dictionary[3] says:

> to ascertain the extent, dimensions, quantity, capacity, etc. of, esp. by comparison with a standard.

This definition undeniably covers the operation of control point determination module 38. Control point determination module 38 ascertains the dimension of the control point of an article. In particular, it measures the distance the control point is located from a landmark on the package, such as its leading or trailing edge (page 10, lines 1-15). Stated alternatively, it

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[3] Barnes & Noble Books, 1996, p. 1192.

ascertains the distance the control point is located from a landmark on the article, which is another way of saying that it measures the location of the control point.

The specification makes it very clear that the control point is measured. Page 9, lines 26-31 state:

> While in the past the control point was often assumed to be the center of the article, control point determination module 38 actually measures the location of the control point.
> Control point determination module 38 measures the location of an article's control point by monitoring the gap, if there is one, between the trailing edge of article 34d and the leading edge of article 34c... [Emphasis added].

The specification then goes on to explain in further detail how the measurement of the control point is accomplished. This process fits the ordinary and accustomed meaning of the term "measure," and the rejection of claims 60-61, 70-71, 80-81, and 90-91 because they use the term "measure," or its variants, should be withdrawn.

F. (Issue #6) Claims 55-94 Are Not Anticipated or Rendered Obvious in Light of U.S. Patent No. 4,369,876 Issued to Small

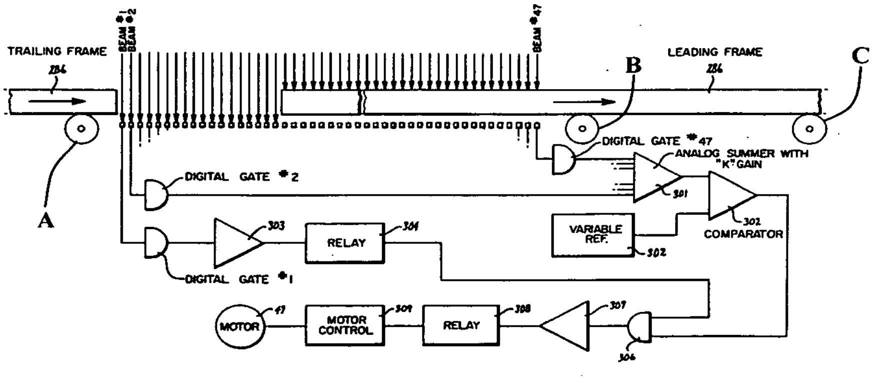
Claims 55-94 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 4,369,876 issued to Small, although, as noted above, the Examiner may have intended an anticipation rejection. In either event, claims 55-94 are neither anticipated by nor rendered obvious in light of the Small patent.

The rejection of claims 55-94 for allegedly being anticipated by the Small patent is incorrect for at least two separate reasons: (1) the Small patent fails to teach, disclose, or suggest adjusting the speed of a conveying surface as a function of an article control point, and (2) the Small patent fails to teach, disclose, or suggest the sequential adjustment of gaps between articles at sequentially arranged conveying surface interfaces. For either of these reasons, which are discussed below in subsections 1 and 2, the Small rejection of claims 55-94 should be withdrawn.

The Small rejection of certain groups of claims should also be withdrawn for additional reasons. Specifically, claims 59, 69, 79, and 89, which stand or fall together separate from the other claims, are not properly rejected by the Small patent because Small does not teach, suggest, or disclose assuming a control point. Claims 60-61, 70-71, 80-81, and 90-91, which stand or fall together separate from the other claims, are not properly rejected by the Small patent because Small does not teach, suggest, or disclose measuring a control point. Claims 64, 74, 84, and 94, which stand or fall together separate from the other claims, are not properly rejected by the Small patent because Small does not teach, suggest, or disclose making a downstream conveyor an adjustable speed conveyor. Claims 65-68, 72-73, 85-88, and 92-93, which stand or fall together separate from the other claims, are not properly rejected by the Small patent because Small does not teach, suggest, or disclose the detection of multiple gaps between articles. The additional reasons why these individual groups of claims are not properly rejected by the Small patent are set forth below in subsections 3-6.

1. Claims 55-94 Are Allowable Over Small Because Small Does Not Teach, Suggest, or Disclose Controlling the Speed of Motor 49 as a Function of the Position of Any Control Points

Before proceeding to discuss Small's failure to disclose control points in more detail, it may be helpful to briefly describe the operation of the conveyor system disclosed in the Small patent. The system's operation may best be understood with reference to Figure 20 and the accompanying description starting at column 10, lines 54 and ending at column 14, line 11. The conveying system moves frames 286 and prevents them from bumping into each other on the conveyor system by way of a conveyor spacer assembly 88, whose components are illustrated in Fig. 20. Figure 20 has been reproduced herein and the labels A, B, and C have been added to three different conveyor rollers for purposes of aiding the following discussion.



F i g. 20

The circuitry illustrated in Fig. 20 controls the speed of motor 49 which is in turn connected to roller A. Motor 49 thus controls the speed of roller A. Motor 49 operates at one of two different speeds: fast and slow. Rollers B and C, on the other hand, operate at only a single speed: slow. The slow speed of rollers B and C is the same as the slow speed of roller A. The speed of roller A is initially set at the high speed so that the trailing frame 286 is advanced closer and closer to the leading frame 286 (which is moving at the slow speed) until a predetermined spacing is achieved between the two frames. This predetermined spacing is measured by the light beams #2-47. When that predetermined spacing is achieved, roller A is changed to the slow speed, thereby preserving the predetermined spacing until the next frame advances up to conveyor spacer assembly 88. When the next frame reaches spacer assembly 88, the process repeats itself. That is, the trailing frame is advanced at a high speed toward the leading frame until the desired spacing is achieved, and then changed to the slow speed to preserve the desired spacing.

Page 4 of the April 30 Office Action contends that Small discloses all of the elements of the pending claims because "the control point of the articles can be the front or trailing end [of one of the frames]." As noted above, however, the Small patent makes no mention of control points, or any concept similar to control points. To call the leading or trailing edges of the Small frames control points is to arbitrarily apply a label to the frames of Small that doesn't exist in the Small disclosure. While the Small frames may inherently have a control point that defines the moment control transitions from roller A to roller B, any such inherent control point does not mean that Small controls the speed of any rollers as a function of the position of the control points. Quite to the contrary, the Small system is completely oblivious to control points.

If the leading or trailing edges of the frames of the Small system are labeled control points, this raises the question: where are the reference points that these control points have to reach to signify the transition from roller A to roller B? Clearly, the reference point is not the midway point between rollers A and B because whenever a leading or trailing edge of a frame is between rollers A and B, it is resting on either roller A or roller B and the transition can only occur when the frame is on both of these rollers.

The adjustment of conveyor speed is undertaken in the Small patent because the positions of the leading and trailing edges of the frames determine the size of the gaps between frames and certainly not as a function of the leading and trailing edges with respect to the conveyor surface interface. This action is not undertaken because the leading and trailing edges are control points. Saying that the leading or trailing edges of the frame could be control points fails to make up for Small's lacking disclosure. Simply adding a label does not create a system that controls the conveyor speed as a function of control points; it merely adds a label that is not acknowledged, utilized, monitored, or acted upon in any fashion whatsoever, whether directly, indirectly, or otherwise, by the Small system. The Small rejection of all of the pending claims should be withdrawn because Small fails to disclose or suggest controlling a conveyor as a function of the location of control points with respect to the conveying surface interface.

2. Claims 55-94 are Allowable over Small Because Small Does Not Teach, Suggest, or Disclose Sequentially Adjusting Gaps Between Articles at a Series of Sequentially Arranged Conveying Surfaces

Small also does not anticipate or render obvious any of the claims of the present application because the Small patent fails to disclose, teach or suggest a system that sequentially adjusts gaps between articles at a series of sequentially arranged conveying surfaces. An example of such a sequentially adjusting system is disclosed in the specification at page 15, lines 1-4. The system disclosed in Small uses only a single spacer system 88 to control the spacing between frames. It fails to disclose, suggest, or teach sequential adjustment of gaps between articles. For this additional reason, the rejection of all of the claims in light of the Small patent is improper and should be withdrawn.

3. Claims 59, 69, 79, and 89 Are Allowable Over Small Because Small Does not Teach, Suggest, or Disclose Assuming a Control Point

Dependent claims 59, 69, 79, and 89 are not properly rejected by the Small patent because these four claims recite assuming the location of control points, or a slight variant thereof. As discussed above, the Small patent does not teach, suggest, or disclose the concept of control points at all. It therefore fails to teach, suggest, or disclose the assumption of their location. For this additional reason, claims 59, 69, 79, and 89 are allowable over the Small patent.

4. Claims 60-61, 70-71, 80-81, and 90-91 Are Allowable Over Small Because Small Does Not Teach, Suggest, or Disclose Measuring a Control Point

Dependent claims 60-61, 70-71, 80-81, and 90-91 are not properly rejected by the Small patent because these claims recite measuring the location of control points, or a slight variant thereof. As discussed above, the Small patent does not teach, suggest, or disclose the concept of control points at all. It therefore fails to teach, suggest, or disclose the measurement of their location. For this additional reason, claims 60-61, 70-71, 80-81, and 90-91 are allowable over the Small patent.

5. Claims 64, 74, 84, and 94 Are Allowable Over Small Because Small Does Not Teach, Suggest, or Disclose Making a Downstream Conveyor an Adjustable Speed Conveyor.

Dependent claims 64, 74, 84, and 94 are not properly rejected by the Small patent because these four claims all specify that the conveying surface interfaces include an upstream conveying and a downstream conveying surface, and that the downstream conveying surface comprises an adjustable speed conveying surface. Small does not teach, suggest, or disclose this. With reference to Figure 20, reproduced above, Small teaches adjusting the speed of roller A while keeping the speed of roller B and C constant. Thus, Small discloses that the *upstream* conveyor is an adjustable speed conveyor, not the *downstream* conveyor. Because Small does not teach, suggest, or disclose making a downstream conveyor an adjustable speed conveyor, claims 64, 74, 84, and 94 are allowable over the Small patent.

6. Claims 65-68, 72-73, 85-88, and 92-93, Are Allowable over Small Because Small Does Not Disclose or Suggest Sensing Multiple Gaps

Independent claims 65 includes the following limitation:

> said article sensor assembly adapted to sensing multiple gaps
> between articles at a time...

Independent claim 85 includes the following limitation:

> sensing with said article sensor assembly multiple gaps
> between articles at a time,...

The Small patent neither anticipates nor renders obvious the subject matter of claims 65-68, 72-73, 85-88, and 92-93 because the Small patent does not disclose or suggest the sensing of multiple gaps between articles. In fact, the Small patent teaches away from sensing multiple gaps. Light beams #1-47 are positioned between rollers A and B (see Fig. 20 reproduced above). In order for these light beams to sense multiple gaps, the light beams would have to simultaneously detect both the front and trailing edge of at least one frame. But in order for the light beams to simultaneously detect the front and trailing edge of a frame, the frame would have to be floating in thin air between rollers A and B because Small discloses no supports for the frame other than rollers A and B, which are both outside the detectable area of the light beams. Accordingly, the Small patent not only fails to disclose the detection of multiple gaps between articles, it teaches away from such a concept because it discloses a system that renders such detection impossible. For at least this addition reason, claims 65-68, 72-73, 85-88, and 92-93 are allowable over the Small patent.

G. Additional Comments

It is not clear from the April 30 Office Action how many independent §112 rejections the Examiner intended to make. While Applicant believes the foregoing discussion has addressed all of the independent §112 rejections, the Office Action included over two pages of discussion of §112 rejections. In that discussion, the Examiner made some comments that, though they may not have formed an independent basis for rejecting the claims, Applicant would like to address. First, Applicant would like to respond to the Examiner's comments regarding the gap detector circuitry, as discussed below in subsection 1. Second, Applicant would like to respond to the Examiner's comments regarding non-identical articles, as discussed below in subsection 2.

1. Gap Detector Circuitry

The bottom of page 3 of the April 30 Office Action includes comments stating that the gap selector circuitry allegedly must be very complex, and that the standards and reasoning for selecting a gap are not mentioned in the specification. Applicant believes this statement was inadvertently incorporated into the April 30 Office Action as part of the rejections made in the parent application. Applicant believes this for several reasons. First, during a personal interview with Applicant's attorney of April 2, 2003, in the parent application, the Examiner agreed that the gap selector circuitry is adequately described in the specification and that the rejection based on the gap selection circuitry allegedly being inadequately described would be withdrawn. This fact was confirmed by the Examiner's allowance of the parent application, which includes claims reciting the selection of a gap, and which therefore evidences a conclusion that selecting a gap was adequately described in the specification.

Second, the gap control selector 66 is adequately disclosed in the application. Gap detector 64 detects any one or more of the article gaps that are present within the detectable area of sensor array 62 (page 12, lines 14-15). This information is passed from gap detector 64 to gap selector 66 (page 12, line 15). Gap selector 66 simply chooses the one of the detected plural gaps which is controllable based upon the location of the article's control point (page 12, lines 17 and 18). As would be apparent to one skilled in the art from reading pages 12 and 13 of the specification, as well as the rest of specification, a gap is controllable in the illustrated embodiment until the control point of the upstream article that partially defines the gap has reached its corresponding reference point. This control point information may be fed to gap selector 66 from control point calculator 56, as illustrated in FIG. 1. After the control point reaches the reference point, the gap behind the article's trailing edge is then selected as the next gap to control, and so on (page 13, lines 30-31). In the illustrated embodiment, gap selector 66 continues to simply select the next most upstream gap whenever the control point passes its associated reference point. Applicant submits that the logic and/or circuitry necessary to implement this selection would not necessarily be unduly complex and would be well within the skill of a person of ordinary skill in the art based upon the disclosure of this application.

Third, the accompanying declaration of Jerry Jakeway rebuts the conclusion that the gap selector is unduly complex or incompletely described. As set forth in this declaration, the steps for selecting which gap to control are simple. (Jakeway ¶10). The gap to be selected is the downstream-most gap that can still be controlled. (Jakeway ¶9). Determining which gap this is amongst multiple gaps can be accomplished, for example, by simply waiting for the appropriate sensor of array 62 to become unblocked. (Jakeway ¶10). This process is described in more detail in paragraph 10 of the Jakeway declaration. To one skilled in the art, the article gap selection process is fully disclosed in the specification of the present application. (Jakeway ¶9).

For these reasons, Applicant submits that there can be no independent rejection of the claims based upon any alleged inadequacies in the description of the gap selector.

2. Non-Identical Articles

Page two of the April 30 Office Action raises the issue of non-identical articles vs. identical articles. Specifically, it is contended that issues of friction differences between articles or article's centers of gravity will seriously affect the operation of the equipment if non-identical articles are handled. Applicant believes this statement was also inadvertently incorporated into the April 30 Office Action for similar reasons set forth with respect to the gap detector circuitry. Also, there is similar evidence that the Examiner agrees that there is no requirement that the articles be identical.

Applicant wishes to state for the record in this application that the handling of articles that vary in size, shape, weight, center of gravity, or other aspects, will not in fact affect operation of the equipment. (Jakeway ¶17). Non-identical articles may have their control points at different relative locations, but this does not change the operation of the system. The control points may either be measured or assumed. If they are measured, control point module 56 accounts for variations in size, weight, or other factors (Jakeway ¶14). If they are assumed, these variations are irrelevant. Neither scenario requires the articles to have identical characteristics.

For these reasons Applicant submits that there can be no independent rejection of the claims based upon non-identical articles v. identical articles.

IX. CONCLUSION

In light of all of the foregoing comments, Applicant believes all of the rejections of claims 55-94 should be withdrawn.

Respectfully submitted,
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Enclosures

IX. APPENDIX

55. An induction subsystem for a conveyor sortation system, said induction subsystem comprising:

a plurality of tandem conveying surfaces defining a series of sequentially arranged conveying surface interfaces, at least one of said conveying surfaces associated with each of said conveying surface interfaces being an adjustable-speed conveying surface;

at least one article sensor adjacent at least one of said conveying surface interfaces, said at least one article sensor providing information on positions of the articles;

a control responsive to said at least one article sensor, said control controlling the speeds of said tandem conveying surfaces in a manner that establishes controlled gaps between articles, said control identifies a controllable gap that can be adjusted between articles at a particular conveying surface interface and adjusting the controllable gap at the particular conveying surface interface, said control adjusts the controllable gap by adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface using a feedback controller;

said feedback controller adjusts the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface as a function of a position of at least one article control point with respect to the particular conveying surface interface, said feedback controller monitoring the controllable gap while adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface; and

wherein gaps between articles are sequentially adjusted at said series of sequentially arranged conveying surface interfaces.

56. The induction subsystem of claim 55 wherein said at least one article sensor comprises at least one chosen from a horizontal photo-detector array and a camera.

57. The induction subsystem of claim 55 including another plurality of tandem conveying surfaces upstream of said plurality of tandem conveying surfaces, said another plurality of tandem conveying surfaces defining at least one other conveying surface interface, said control including an open-loop controller, said open-loop controller adjusting gaps between articles at said at least one other conveying surface interface.

58. The induction system of claim 55 wherein said feedback controller comprises a proportional-integral-derivative controller.

59. The induction system of claim 55 wherein said control assumes control points of articles.

60. The induction system of claim 55 wherein said control measures control points of articles upstream of said plurality of tandem conveying surfaces.

61. The induction system of claim 60 wherein said control selects an acceleration value of said variable speed conveying surface as a function of the control point of an article being accelerated.

62. The induction system of claim 55 wherein said feedback controller outputs multiple commands per second to adjust the speed of said adjustable-speed conveying surface.

63. The induction system of claim 55 wherein each of said conveying surface interfaces includes an upstream conveying surface and a downstream conveying surface, wherein said upstream conveying surface comprises said adjustable-speed conveying surface.

64. The induction system of claim 55 wherein each of said conveying surface interfaces includes an upstream conveying surface and a downstream conveying surface, wherein said downstream conveying surface comprises said adjustable-speed conveying surface.

65. An induction subsystem for a conveyor sortation system, said induction subsystem comprising:

a plurality of tandem conveying surfaces defining a series of sequentially arranged conveying surface interfaces, at least one of said conveying surfaces associated with each of said conveying surface interfaces being an adjustable-speed conveying surface;

an article sensor assembly adjacent at least one of said conveying surface interfaces, said article sensor assembly adapted to sensing multiple gaps between articles at a time and repetitively providing information on positions of the articles;

a control responsive to said article sensor assembly, said control controlling the speeds of said tandem conveying surfaces in a manner that establishes controlled gaps between articles, said control identifies a controllable gap that can be adjusted between articles at a particular conveying surface interface and adjusting the controllable gap at the particular conveying surface interface, said control adjusts the controllable gap by adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface using a feedback controller;

said feedback controller adjusts the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface as a function of a position of at least one article control point with respect to the particular conveying surface interface, said feedback controller monitoring the controllable gap while adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface; and

wherein gaps between articles are sequentially adjusted at said series of sequentially arranged conveying surface interfaces.

66. The induction subsystem of claim 65 wherein said article sensor assembly comprises at least one chosen from a horizontal photo-detector array and a camera.

67. The induction subsystem of claim 65 including another plurality of tandem conveying surfaces upstream of said plurality of tandem conveying surfaces, said another plurality of tandem conveying surfaces defining at least one other conveying surface interface, said control including an open-loop controller, said open-loop controller adjusting gaps between articles at said at least one other conveying surface interface.

68. The induction system of claim 65 wherein said feedback controller comprises a proportional-integral-derivative controller.

69. The induction system of claim 65 wherein said control assumes control points of articles.

70. The induction system of claim 65 wherein said control measures control points of articles upstream of said plurality of tandem conveying surfaces.

71. The induction system of claim 70 wherein said control selects an acceleration value of said variable speed conveying surface as a function of the control point of an article being accelerated.

72. The induction system of claim 65 wherein said feedback controller outputs multiple commands per second to adjust the speed of said adjustable-speed conveying surface.

73. The induction system of claim 65 wherein each of said conveying surface interfaces includes an upstream conveying surface and a downstream conveying surface, wherein said upstream conveying surface comprises said adjustable-speed conveying surface.

74. The induction system of claim 65 wherein each of said conveying surface interfaces includes an upstream conveying surface and a downstream conveying surface, wherein said downstream conveying surface comprises said adjustable-speed conveying surface.

75. A method of controlling gaps between articles traveling on a conveyor system, said method comprising:

providing a plurality of tandem conveying surfaces defining a series of sequentially arranged conveying surface interfaces, at least one of said conveying surfaces associated with each of said conveying surface interfaces being an adjustable-speed conveying surface;

providing at least one article sensor adjacent at least one of said conveying surface interfaces and sensing articles with said at least one article sensor, including providing information regarding positions of the articles;

controlling the speeds of said tandem conveying surfaces in response to said information regarding positions of the articles in a manner that establishes controlled gaps between articles, including identifying a controllable gap that can be adjusted between articles at a particular conveying surface interface and adjusting the controllable gap at the particular conveying surface interface, said adjusting the controllable gap including adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface using a feedback controller;

said feedback controller adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface as a function of a position of at least one article control point with respect to the particular conveying surface interface, said feedback controller monitoring the controllable gap while adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface; and sequentially adjusting gaps between articles at said series of sequentially arranged conveying surface interfaces.

76. The method of claim 75 wherein said at least one article sensor comprises at least one chosen from a horizontal photo-detector array and a camera.

77. The method of claim 75 including providing another plurality of tandem conveying surfaces upstream of said plurality of tandem conveying surfaces, said another plurality of tandem conveying surfaces defining at least one other conveying surface interface, and further including providing an open-loop controller and adjusting gaps between articles with said open-loop controller at said at least one other conveying surface interface.

78. The method of claim 75 wherein said feedback controller comprises a proportional-integral-derivative controller.

79. The method of claim 75 including assuming control points of articles.

80. The method of claim 75 including measuring control points of articles upstream of said plurality of tandem conveying surfaces.

81. The method of claim 80 wherein said control selects an acceleration value of said variable speed conveying surface as a function of the control point of an article being accelerated.

82. The method of claim 75 wherein said feedback controller outputs multiple commands per second to adjust the speed of said adjustable-speed conveying surface.

83. The method of claim 75 wherein each of said conveying surface interfaces comprises an upstream conveying surface and a downstream conveying surface, wherein said upstream conveying surface comprises said adjustable-speed conveying surface.

84. The method of claim 75 wherein each of said conveying surface interfaces comprises an upstream conveying surface and a downstream conveying surface, wherein said downstream conveying surface comprises said adjustable-speed conveying surface.

85. A method of controlling gaps between articles traveling on a conveyor system, said method comprising:

providing a plurality of tandem conveying surfaces defining a series of sequentially arranged conveying surface interfaces, at least one of said conveying surfaces associated with each of said conveying surface interfaces being an adjustable-speed conveying surface;

providing an article sensor assembly adjacent at least one of said conveying surface interfaces and sensing with said article sensor assembly multiple gaps between articles at a time, including repetitively providing information regarding positions of the articles;

controlling the speeds of said tandem conveying surfaces in response to said information regarding positions of the articles in a manner that establishes controlled gaps between articles, including identifying a controllable gap that can be adjusted between articles at a particular conveying surface interface and adjusting the controllable gap at the particular conveying surface interface, said adjusting the controllable gap including adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface using a feedback controller;

said feedback controller adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface as a function of a position of at least one article control point with respect to the particular conveying surface interface, said feedback controller monitoring the controllable gap while adjusting the speed of the adjustable-speed conveying surface associated with the particular conveying surface interface; and

sequentially adjusting gaps between articles at said series of sequentially arranged conveying surface interfaces.

86. The method of claim 85 wherein said article sensor assembly comprises at least one chosen from a horizontal photo-detector array and a camera.

87. The method of claim 85 including providing another plurality of tandem conveying surfaces upstream of said plurality of tandem conveying surfaces, said another plurality of tandem conveying surfaces defining at least one other conveying surface interface, and further including providing an open-loop controller and adjusting gaps between articles with said open-loop controller at said at least one other conveying surface interface.

88. The method of claim 85 wherein said feedback controller comprises a proportional-integral-derivative controller.

89. The method of claim 85 including assuming control points of articles.

90. The method of claim 85 including measuring control points of articles upstream of said plurality of tandem conveying surfaces.

91. The method of claim 90 wherein said control selects an acceleration value of said variable speed conveying surface as a function of the control point of an article being accelerated.

92. The method of claim 85 wherein said feedback controller outputs multiple commands per second to adjust the speed of said adjustable-speed conveying surface.

93. The method of claim 85 wherein each of said conveying surface interfaces comprises an upstream conveying surface and a downstream conveying surface, wherein said upstream conveying surface comprises said adjustable-speed conveying surface.

94. The method of claim 85 wherein each of said conveying surface interfaces comprises an upstream conveying surface and a downstream conveying surface, wherein said downstream conveying surface comprises said adjustable-speed conveying surface.

OIPE JC48
OCT 1 3 2004
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : David W. Zeitler
Application No. : 09/851,021
Group Art Unit : 3651
Filing Date : May 8, 2001
Title : **CONVEYOR INDUCT SYSTEM**
Attorney Docket No. : RAP04 P-608B
Examiner : Joseph Valenza

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

DECLARATION OF JERRY J. JAKEWAY UNDER 37 C.F.R. §1.132

I, Jerry J. Jakeway, declare as follows:

1. I have been retained as a technical expert by Siemens Dematic, the owner of the above-identified patent application, to evaluate this patent application and the Office Actions issued from the U.S. Patent Office for this application. I submit this declaration in response to the Office Action mailed September 27, 2002. I am being compensated by Siemens Dematic for my work in this regard at the rate of 125 dollars per hour.

2. I am currently a Principal Staff Engineer for Smiths Industries, Grand Rapids, Michigan. I have done consulting work for Siemens Dematic's predecessor companies in the past.

3. I hold bachelor of science degrees in agricultural and electrical engineering from Michigan State University, and have approximately 80 hours of post graduate work at Michigan State University and the Massachusetts Institute of Technology in the field of System Science.

4. Smiths Industries in Grand Rapids was originally founded by Bill Lear in 1930. Today, it is an engineering and manufacturing company providing the latest technology and products to the aerospace and defense markets as well as commercial electronics. The company has designed, developed and manufactured defense, aerospace and commercial aviation electronics systems for more than four decades.

5. Prior to my employment at Smiths Industries, I was employed for two years at Automatixs, Incorporated, Billerica, Massachusetts. I worked on robotic and vision systems that used six-degree-of-freedom robots for welding and sealing applications.

6. Prior to working for Automatixs, Incorporated, I was employed for two years as an Analysis Engineer for Raytheon Corporation, Bedford, Massachusetts. I worked in the system design laboratory and did missile guidance, navigation and control simulation studies.

7. Prior to and during my employment at Raytheon, I was engaged in post-graduate studies at Michigan State University and The Massachusetts Institute of Technology accumulating approximately 80 hours towards a Masters Degree in Agricultural Engineering/System Science.

8. I have read the above-identified patent application, including the several Office Actions and the patent applicant's responses thereto. The examiner has raised issues regarding the four following items: (1) the selection of article gaps, (2) the frictional characteristics and conveyor gaps sizes at the conveyor interfaces, (3) the operation of the system using non-identical articles, and (4) U.S. Patent No. 4,369,876. I address each of these issues below.

Gap Selection

9. The article gap selection process outlined within the specification appears fully disclosed. The selected article gap is simply the farthest downstream gap where control is possible. Control of the article is determined by comparing the location of the article's control point to the reference point. When the article's control point passes by the reference point, the next upstream article gap is selected for controlling. This is evident from the specification, particularly pages 12 and 13.

10. In my opinion, the circuitry necessary to select which article gap to control would not be unduly complex. For example, in the situation depicted in FIG. 1 of the patent application, sensor 62 would detect two article gaps: one between articles 34e and 34f, and another between articles 34f and 34g. Because belt 24 is the belt whose speed is being varied to adjust article gaps, the article gap that would be selected is the gap between articles 34f and 34g. This article gap would be selected until the control point of article 34f reached the reference point. Determining when the control point reached the reference point could be as simple as waiting until the sensor labeled S_1 (shown below in FIG. A) became unblocked. Sensor S_1 is

located upstream of the reference point a distance C_1, which is the same distance the control point of article 34f is from the rear of the article. Once sensor S_1 became unblocked, the gap between articles 34f and 34e would be controlled until sensor S_2 became unblocked due to its detecting the rear edge of article 34e. The selection of further gaps would proceed in a like manner. In my opinion, this is all evident to one skilled in the art from the patent application.

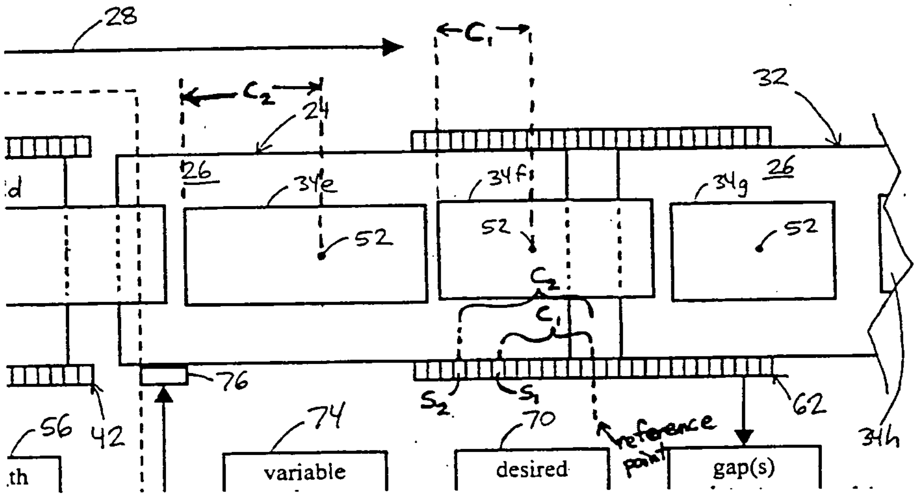

FIG. A

11. From a review of the specification, particularly page 12, lines 2-3, it is clear that sensor array 62 will not always detect multiple gaps between articles. For example, in the situation in which two articles having the same or greater length than sensor array 62 consecutively pass through array 62, the gap between these two articles will never be detected by array 62 simultaneously with another article gap. In other words, when array 62 detects the gap between these two articles, this will be the only gap detected by array 62. Because there is only one gap detected, no gap selection need be made, nor would even be possible. I therefore do not believe the step of gap selection is critical to the invention.

12. One aspect of the invention of this application is the maximization of the amount of time where control of an article is available and then transitioning to the next available article gap. The selected article gap is sequenced upstream based on the projected control point at the interface of conveyors 24, 32 determined by sensor array 42 at the interface of conveyors 22, 24. The essence of the gap selection process is the logic by which control is passed to the next available item. This logic could operate with or without the benefit of the knowledge of an

expected control point switch. As an example, the gap selector could transition to the next item upon the rear edge of the item passing the last sensor on the conveyer.

Frictional Characteristics and Conveyor Gap Sizes

13. The Examiner's contention that frictional coefficients and conveyer gaps are required to determine the control point of the article as defined on page 7 is fundamentally incorrect when an external measurement means as provided by sensor array 42 is present. The control point is defined as follows:

> The control point of an article is the point on the article which, when it is aligned with a specified reference point on the conveyer, will designate the moment in time that the article's speed switches from being controlled from one belt to another belt. (p. 7, lines 17-20).

In the presence of sensor array 42, determination of the control point can proceed as follows:

a.) Locate the most downstream rear edge of an article when available. Time mark and note the sensor location where the gap first appeared.

b.) On successive iterations, relocate the rear most gap. A velocity is calculable from the sensor position of the previous iteration, the sensor position on this iteration, and the elapsed time. The velocity will have a value bounded between the first conveyer and the second conveyer. On an iteration where the calculated velocity demonstrates control according to the second belt, the control point is the distance of the rear most blocked sensor to the reference point.

14. The above process arrives at a value consistent with the definition outlined in the specification. The Examiner's point may be well taken in the absence of sensor array 42. In the absence of a measurement generated by an external sensor, the control point could be calculated given the article weight distribution as a function of longitudinal axis, the frictional coefficients of the surfaces involved, and the gap between the two belts. Inherent in the weight distribution function is the length of the article. If one were to design an experimental apparatus to check how well this calculation went, it would look just like what is disclosed in the patent application if figure 1, item 38. In essence, a key part of this invention is the direct measurement of this point using sensor array 42 rather than the calculation of it; it would be highly impractical to expect a weight distribution function to be submitted for every article.

15. The examiner's point of frictional coefficient and belt gaps differences for use in downstream gap control devices, such as conveyors 24 and 32 of FIG. 1, appears to be worth considering at first glance. If it is contended that the control point at the interface of conveyors 24, 32 may be different than the control point in going from conveyors 22 to 24 when the friction coefficients have a different ratio, or the conveyor gap sizes are different, this reviewer agrees. However to one schooled in the art, there is still utility in measuring the control point at the interface of conveyors 22, 24 and mathematically mapping this measured value to a predicted value at the interface of conveyors 24, 32. This mapping could be as simple as a linear function of the form:

Control Point 24_32 = a*Control_Point_22_24 + b

which relates the control point determined at the interface of conveyors 22, 24 to the control point of the articles at the interface of the conveyors 24 and 32.

16. On a second look at using the control point value in a downstream conveyor, there are subtle aspects to the closed loop control of the article gap and subsequent synchronization of speed at the point of handoff downstream minimizing the practical effect of any frictional interface difference. A person skilled in the art would conclude that the speed of the conveyors 24 and 32 would be synchronized at the moment an article was handed off from conveyor 24 to conveyor 32. To not synchronize these speeds would disrupt the size of the article gaps created by gap controller 40. If the speed of the two conveyors 24, 32 are the same at the point of handoff, the frictional coefficient differences and belt gap will have no effect. It therefore is my opinion that the invention does not require the interface of conveyors 24 and 32 to have the same frictional characteristics as the interface of conveyors 22 and 24. Further, it is my opinion that the size of the conveyor gaps at the interfaces of conveyors 22, 24 and 24, 32 does not need to be identical.

Non-Identical Articles

17. From my review of the patent application, it is clear that the system disclosed therein is intended to operate using articles that may or may not be identical to each other. In fact, one of the key purposes of control point determination unit 56 is to determine the control point of articles that have different sizes, shapes, weights, etc. If all articles were identical, then there would be little purpose to having unit 56 determine control points on more

than one article. A person skilled in this field of art would therefore conclude that the invention of this patent application was not limited to systems that handled only identical articles.

U.S. Patent No. 4,369,876 Issued to Small

18. The Conveyer Induct System of the present application solves a substantially different problem than the Multi-Layer Coating Apparatus System and Method of the Small patent. One of the primary goals of the present invention is to maximize the throughput of the material handling-system. Limitations in the throughput of this system will be the speed and coordination of the conveyers themselves. The limitation in throughput within the Small system, however, is the coating process itself. In other words, the coating process operates at a much lower speed (2-4 ft/sec) than conveyor-type material handling systems, like those of the present invention. The induction system proposed by Small can overtake the coating process and easily maintain gap separation. An analogous problem to the Small problem is to maintain equal automobile separation on the freeway once the traffic backs up. This is quite a different problem than attempting to force the automobiles to traverse the freeway at the very limits of controllability of each vehicle.

19. The disparity in speed capability between the system of the present application and the coating process proposed by Small results in a more tractable problem. The problem is simplified as the first two stages of the induct system described by Small, so called chamber A and B along with free conveyers 46 and 86, will handle one and only one article at a time as opposed to multiple articles required by the induction system described in the pending application. It is clear that the first two stages proposed by Small performs two basics functions (1) move the article through the air lock as quickly as possible, minimizing the disruption to the vacuum of the system, and (2) synchronize to the downstream feed rate of the coating process. This process is described in reasonable detail on page 10 lines 54-68, and page 11 lines 1-34. In brief, the major items of the Induct System of Small includes the following:

1.) endless induction conveyer 27 feeding endless conveyer 46 contained within chamber A.
2.) endless conveyer 86 contained within chamber B fed by endless conveyer 46, and feeding endless conveyer 92 contained within chamber C.
3.) A conveyer separation assembly 88 at the exit of chamber B and before chamber C
4.) Endless conveyer 92 contained within chamber C.

The described operation given within Small precludes conveyer 46 and 86 handling more than one article at a time. The operation of the mechanism is summarized below:

1.) When the system is ready, a frame is placed on conveyer 27, valve V1 opens and the frame is quickly shuttled into chamber A (at 72 Ft/Sec).
2.) Valve V1 is closed and vacuum is applied to chamber A.
3.) When the vacuum reaches the prescribed set-point, and the spacing sensor at the exit of chamber B indicates that the previous sheet in chamber B has cleared conveyer 86, then and only then will conveyers 46 and 86 act in concert to shuttle the plate at 72 ft/min from chamber A to chamber B.
4.) The sheet entering chamber B will shuttle from chamber A to chamber B will travel at 72 ft/min until the leading edge of the sheet approaches the trailing edge of the previous sheet which is downstream from conveyer 86. At this point, the spacing control circuitry will force conveyer 86 to synchronize in speed to conveyer 92 in the steady state. This condition will be maintained until the trailing edge of the newly introduces sheet into chamber B clears the first sensor of spacing mechanism 88.

20. The above process insures that conveyer 86 has one and only one sheet on it at a time. There is no decision process regarding when to hand off the controlling process from one gap to the next as the conveyer 86 is only carrying one item at a time. No determination of control points is made in the Small patent, nor is any method of control taught for multiple items carried on the variable speed conveyer 86. The ability to handoff control from one item to the next with a prime intention of maximizing material handling through-put is an important feature of the present application. This aspect is totally missing form the Small disclosure.

21. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Jan 23, 2003

Date

Jerry J. Jakeway

Jerry J. Jakeway